CLAIMS

1. A dry-type high-voltage load system apparatus having a high-voltage load system circuit comprising: a low-voltage bank composed of a plurality of lower-capacity configuration banks for a low-voltage resistor circuit each composed of a plurality of low-voltage three-phase resistor circuits connected in parallel to each of a plurality of switches connected in parallel to an output terminal of a transformer; and a high-voltage bank composed of a plurality of lower-capacity configuration banks for a high-voltage resistor circuit each composed of a plurality of high-voltage three-phase resistor circuits connected in parallel to each of a plurality of switches, said low-voltage bank and said high-voltage bank being connected in parallel to a high-voltage power generator through a central breaker, characterized by comprising:

said low-voltage three-phase resistor circuit and said high-voltage three-phase resistor circuit each being composed of resistor arrays in three phases, each of said resistor arrays being composed of resistor elements connected in series, in a form of a Y-connection in which three resistor arrays are concentrated for reconciliation of their phase so that an isolated and independent neutral point unconnected commonly to those of the other three-phase resistor circuits is formed, or in a form of a Δ-connection in which each of terminals of said resistor arrays in three phases is connected to each of in-phase branch distribution lines of a power cable, each of said resistor elements comprising: a cylindrical outer tube made of metal; a resistive heat-generating wire wound spirally and extending between inner ends of electrode rods inserted respectively from both ends of said outer tube; an insulating material filling up a space between said resistive heat-generating wire with said electrode rods and an internal surface of said outer tube and fired; and high-voltage proof insulating sleeves extractably encasing and anchored in portions adjacent to the both ends of said outer tube to be supported by various supporters.

2. A dry-type high-voltage load system apparatus as described in claim 1, characterized in that a length and a thickness of said high-voltage proof insulating sleeve are adjustably formed in accordance with an operating voltage.

3. A dry-type high-voltage load system apparatus as described in claim 2, characterized in that said high-voltage proof insulating sleeve is made of sintered ceramic having an insulation

capacity of close to approximately 36 kV for 1 minute when a material with a withstand voltage of 12 kVAC/mm for 1 minute and 3 mm thick is employed.

4. A dry-type high-voltage load system apparatus as described in claim **2** or **3**, characterized in that said high-voltage proof insulating sleeve is around and approximately 3 mm thick and around and approximately 100 mm long.

5. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said resistor arrays are connected in the form of the Y- or Δ-connection to form said high-voltage three-phase resistor circuit in each of said lower-capacity configuration banks of said high-voltage bank.

6. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said resistor arrays are connected in the form of the Δ-connection to form said low-voltage three-phase resistor circuits and in the form of the Y-connection to form said high-voltage three-phase resistor circuit.

7. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said low-voltage bank and said high-voltage bank are housed, for all of said lower-capacity configuration banks, in exclusive zones distributed in each of two vertical rectangular frame boxes each having an air blower, wherein vertical multicolumn arrays of said resistor elements in each of said lower-capacity configuration banks are penetratingly bridged in the exclusive zones by both ends thereof.

8. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said low-voltage bank and said high-voltage bank are housed, for each of said lower-capacity configuration banks, in exclusive zones distributed in a horizontal rectangular frame box having an air blower, wherein lateral multistage arrays of said resistor elements in each of said lower-capacity configuration banks are penetratingly bridged in the exclusive zones by both ends thereof.

9. A dry-type high-voltage load system apparatus as described in claim **7**, characterized in that said vertical rectangular frame box is directly grounded to form a chassis ground.

10. A dry-type high-voltage load system apparatus as described in claim **8**, characterized in that said horizontal rectangular frame is directly grounded to form a chassis ground.

11. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said resistor element for said high-voltage three-phase resistor circuit as Y-connected has a capacity of around and approximately 381 V/1.67 kW.

12. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said resistor element for said high-voltage three-phase resistor circuit as Δ-connected has a capacity of around and approximately 412.5 V/1.74 kW.

13. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said resistor array for said high-voltage three-phase resistor circuit as Y-connected is composed of approximately ten resistor elements connected in series for an operating voltage of 6,600 V.

14. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said resistor array for said high-voltage three-phase resistor circuit as Δ-connected is composed of approximately sixteen resistor elements connected in series for an operating voltage of 6,600 V.

15. A dry-type high-voltage load system apparatus as described in claim **11**, characterized in that said high-voltage three-phase resistor circuit as Y-connected has a capacity of around and approximately 50.1 kW.

16. A dry-type high-voltage load system apparatus as described in claim **13**, characterized in that said high-voltage three-phase resistor circuit as Y-connected has a capacity of around and approximately 50.1 kW.

17. A dry-type high-voltage load system apparatus as described in claim **12**, characterized in that said high-voltage three-phase resistor circuit as Δ-connected has a capacity of around and approximately 83.52 kW.

18. A dry-type high-voltage load system apparatus as described in claim **14**, characterized in that said high-voltage three-phase resistor circuit as Δ-connected has a capacity of around and approximately 83.52 kW.

19. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said high-voltage bank is composed in parallel of one lower-capacity configuration bank of around and approximately 250 kW and three lower-capacity configuration banks of around and approximately 500 kW, said one lower-capacity configuration bank and said three lower-capacity configuration banks being composed in parallel of five and ten high-voltage three-phase resistor circuits as Y-connected, respectively.

20. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said high-voltage bank is composed in parallel of one lower-capacity configuration bank of around and approximately 250 kW and three lower-capacity configuration banks of around and approximately 500 kW, said one lower-capacity configuration bank and said three lower-capacity configuration banks being composed in parallel of three and six high-voltage three-phase resistor circuits as Δ-connected, respectively.

21. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said low-voltage bank is composed in parallel of two lower-capacity configuration banks of around and approximately 62.5 kW and one lower-capacity configuration bank of around and approximately 125 kW, said two lower-capacity configuration banks and said one lower-capacity configuration bank being composed in parallel of a plurality of said low-voltage three-phase resistor circuits as Y- and Δ-connected, respectively.

22. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said supporters are arrangement boards on both sides of a rectangular frame box of a chassis-ground-type, of which a cooling air intake opening and a heated air exhaust opening are respectively provided at a bottom and a top thereof.

23. A dry-type high-voltage load system apparatus as described in claim **22**, characterized

in that said arrangement boards have circular holding holes each having a dimension allowing said high-voltage proof insulating sleeve to extractably penetrate vertically or horizontally in mutually alternate multiple stages or multiple columns by shifting by half an arranging position in each horizontal stage in case that a vertical rectangular frame box is employed and in each vertical column in case that a horizontal rectangular frame box is employed.

24. A dry-type high-voltage load system apparatus as described in claim **23**, characterized in that said resistor element is penetratingly bridged through said holding holes opened on both sides of said arrangement boards of said vertical or horizontal rectangular frame box with supports of said high-voltage proof insulating sleeves anchored to said holding holes by means of spring grooved retaining rings, and is capable of being extracted from said holding holes together with said high-voltage proof insulating sleeves.

25. A dry-type high-voltage load system apparatus as described in claim **1**, **2** or **3**, characterized in that said high-voltage load system circuit is composed by connecting mutually in parallel a voltmeter to said power cable on a side of said high-voltage power generator and an ammeter through an overcurrent relay to said power cable on a bank side by intermediately positioning said central breaker, connecting a wattmeter to a position between said voltmeter and said ammeter, and connecting a ground relay to said power cable bridging said power generator and said voltmeter.

26. A dry-type high-voltage load system apparatus as described in claim **7**, characterized in that said two vertical rectangular frame boxes are installed in a load room of an installing-type housing, said load room having heated air exhaust windows and cooling air intake windows of open/close-types respectively at a top wall side and both lateral wall sides thereof respectively corresponding to said heated air exhaust openings and said air blowers of said vertical rectangular frame boxes, and are adjoining through a partition wall to an instrument panel room prepared at one-side of said install-type housing, said instrument panel room having a door, in which said transformer and said switches are provided at an external wall side of said instrument panel room, said external wall side having a control panel and an instrument panel.

27. A dry-type high-voltage load system apparatus as described in claim **8**, characterized in

that said one horizontal rectangular frame box is installed in a load room of an installing-type housing, said road room having a heated air exhaust window of a shutter-type and a cooling air intake window respectively at an end wall side and both lateral wall sides thereof respectively corresponding to said heated air exhaust opening and said air blower of said horizontal rectangular frame box, and is adjoining through a partition wall to an instrument panel room prepared at on-side of said install-type housing, said instrument panel room having upper and lower compartments, in which a control panel and an instrument panel, and said transformer and said switches are respectively provided at said upper and lower compartments.

28. A dry-type high-voltage load system apparatus as described in claim **7**, characterized in that said two vertical rectangular frame boxes are installed in a load room of an all-weather hermetic container loaded onto a loading platform of an autotruck, said load room having heated air exhaust windows and cooling air intake windows of open/close-types respectively at a top wall side and both lateral wall sides thereof respectively corresponding to said heated air exhaust openings and said air blowers of said vertical rectangular frame boxes, and are adjoining through a partition wall to a control room and an appliance room arranged orderly from a front side of said autotruck, each of said control and appliance rooms having doors, in which a control panel and an instrument panel, and said transformer and said switches are respectively provided at said control and appliance rooms.

29. A dry-type high-voltage load system apparatus as described in claim **8**, characterized in that said one horizontal rectangular frame box is installed in a load room of an all-weather hermetic container of a small-type loaded onto a loading platform of an autotruck of a small-type, said load room having heated air exhaust windows of a shutter-type and cooling air intake windows of an open/close-type respectively at a whole rear wall side and both lateral wall sides thereof respectively corresponding to said heated air exhaust opening and said air blower of said horizontal rectangular frame boxes, and are adjoining through a partition wall to a control room, said control room having a door, in which a control panel, an instrument panel, said transformer and said switches are provided at said control room.

30. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus having a high-voltage load system circuit comprising: a low-

voltage bank composed of a plurality of lower-capacity configuration banks for a low-voltage resistor circuit each composed of a plurality of low-voltage three-phase resistor circuits connected in parallel to each of a plurality of switches connected in parallel to an output terminal of a transformer; and a high-voltage bank composed of a plurality of lower-capacity configuration banks for a high-voltage resistor circuit each composed of a plurality of high-voltage three-phase resistor circuits connected in parallel to each of a plurality of switches, said low-voltage bank and said high-voltage bank being connected in parallel to a high-voltage power generator through a central breaker, characterized by comprising steps of:

composing said low-voltage three-phase resistor circuit and said high-voltage three-phase resistor circuit by means of resistor arrays in three phases, each of said resistor arrays being composed of resistor elements connected in series, in a form of a Y-connection in which three resistor arrays are concentrated for reconciliation of their phase so that an isolated and independent neutral point unconnected commonly to those of the other three-phase resistor circuits is formed, or in a form of a Δ-connection in which each of terminals of said resistor arrays in three phases is connected to each of in-phase branch distribution lines of a power cable, each of said resistor elements comprising: a cylindrical outer tube made of metal; a resistive heat-generating wire wound spirally and extending between inner ends of electrode rods inserted respectively from both ends of said outer tube; an insulating material filling up a space between said resistive heat-generating wire with said electrode rods and an internal surface of said outer tube and fired; and high-voltage proof insulating sleeves extractably encasing and anchored in portions adjacent to the both ends of said outer tube to be supported by various supporters; and

preventing the arc discharge which may occur between said resistor elements and said supporters or mutually between said resistor elements arranged in parallel as well as the chain breaking which may occur through said terminals.

31. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **30**, characterized in that a length and a thickness of said high-voltage proof insulating sleeve are adjustably formed in accordance with an operating voltage.

32. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **31**, characterized in that said high-voltage

proof insulating sleeve is made of sintered ceramic having an insulation capacity of close to approximately 36 kV for 1 minute when a material with a withstand voltage of 12 kVAC/mm for 1 minute and 3 mm thick is employed.

33. A method of preventing chain breaking and arc discharge of a dry-type high-voltage load system apparatus as described in claim **31** or **32**, characterized in that said high-voltage proof insulating sleeve is around and approximately 3 mm thick and around and approximately 100 mm long.

34. A method of preventing chain breaking and arc discharge of a dry-type high-voltage load system apparatus as described in claim **30, 31** or **32**, characterized in that said supporters are arrangement boards on both sides of a rectangular frame box, and both ends of said resistor elements are penetratingly bridged between said rectangular frame alternately at equal intervals in vertical multiple columns or horizontal multiple stages so that the adjoining columns or stages may be staggered.

35. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **30**, **31** or **32**, characterized in that said resistor element for said high-voltage three-phase resistor circuit as Y-connected has a capacity of around and approximately 381 V/1.67 kW.

36. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **30**, **31** or **32**, characterized in that said resistor element for said high-voltage three-phase resistor circuit as Δ-connected has a capacity of around and approximately 412.5 V/1.74 kW.

37. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **30**, **31** or **32**, characterized in that said resistor array for said high-voltage three-phase resistor circuit as Y-connected is composed of approximately ten resistor elements connected in series for an operating voltage of 6,600 V.

38. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **30**, **31** or **32**, characterized in that said

resistor array for said high-voltage three-phase resistor circuit as Δ-connected is composed of approximately sixteen resistor elements connected in series for an operating voltage of 6,600 V.

39. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **35**, characterized in that said high-voltage three-phase resistor circuit as Y-connected has a capacity of around and approximately 50.1 kW.

40. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **37**, characterized in that said high-voltage three-phase resistor circuit as Y-connected has a capacity of around and approximately 50.1 kW.

41. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **36**, characterized in that said high-voltage three-phase resistor circuit as Δ-connected has a capacity of around and approximately 83.52 kW.

42. A method of preventing chain breaking and arc discharge for use with a dry-type high-voltage load system apparatus as described in claim **38**, characterized in that said high-voltage three-phase resistor circuit as Δ-connected has a capacity of around and approximately 83.52 kW.